Effect of beach roughness on tsunami run-up

Michelle H. Teng and Kelie Feng

Department of Civil Engineering, University of Hawaii at Manoa, Honolulu, Hawaii, U.S.A.[1]

Abstract. A joint numerical and experimental study is carried out to investigate the effect of beach roughness on tsunami run-up and to examine the validity of Manning's formula for modeling the roughness effect. In the experiment, artificial beaches roughened with sand and small gravel of different sizes were set up inside a large wave tank. An experimental methodology was developed to determine the Manning's coefficient quantitatively for each roughened artificial beach surface. The maximum run-up of non-breaking solitary waves on artificial beaches with different slope and roughness was measured. These measured results were compared with the numerical results based on the shallow water equations and the Manning's formula. Our results show that, for waves running up over mildly sloped beaches, the roughness effect is quite significant and can reduce the maximum run-up height by as much as 50% compared with the inviscid predictions. The Manning's formula is found to provide satisfactory predictions for the roughness effect on run-up on relatively steep slopes; however, for run-up on mild slopes, some noticeable discrepancies between the numerical and experimental results were observed. Detailed experimental set-up and the experimental and numerical results will be described in a poster presentation.

[1]Department of Civil Engineering, University of Hawaii at Manoa, 2540 Dole Street, Holmes Hall 383, Honolulu, HI 96822, U.S.A.(teng@wiliki.eng.hawaii.edu)